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NEWS AND TRENDS . . .

IN CITY DEVELOPMENT

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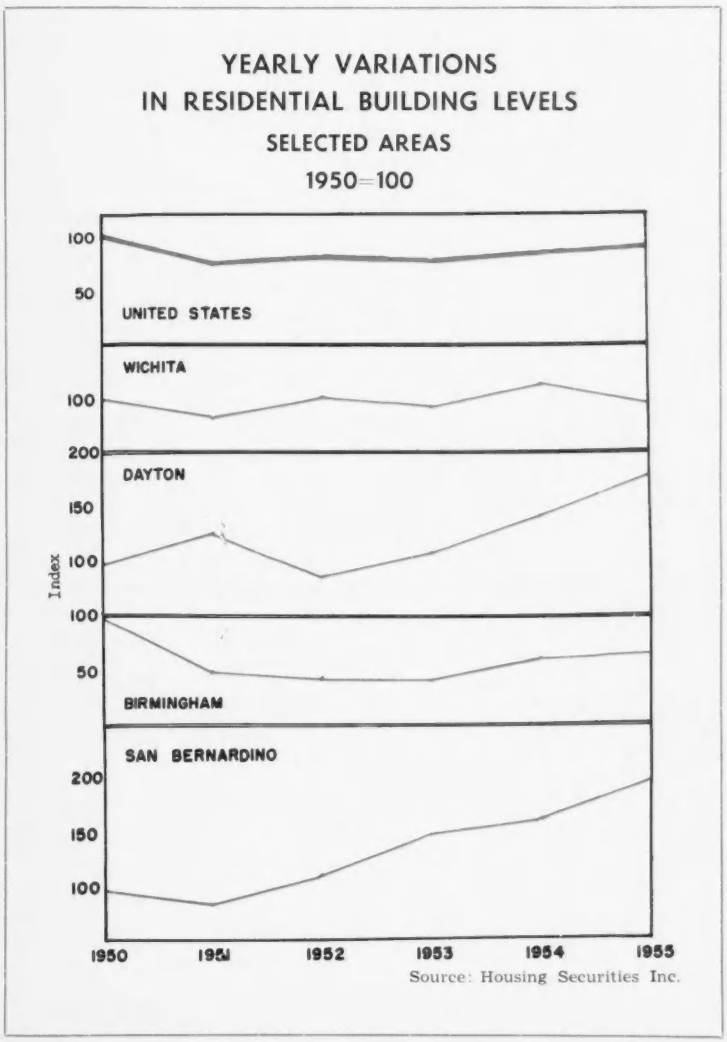
RESIDENTIAL GROWTH PATTERNS IN METROPOLITAN AREAS

By

URIEL MANHEIM, Economist
Housing Securities Inc., New York City



Source: Housing Securities Inc.

Editor's Note

Understanding the characteristics of a local housing market is difficult unless a perspective is obtained through comparisons with other communities. Similarly, statistics about residential building volumes are needed for programming local construction and for measuring mortgage activity. Interpretations from trends revealed by housing growth figures are helpful in predicting future growth possibilities and in estimating demands for services and requirements in community facilities. Such trends are essential in all facets of urban planning.

The material on which the author bases this article is culled from his comprehensive study of 75 key metropolitan areas. This study, as an annual summary volume for 1956, was reviewed by **Urban Land** in the February 1957 issue. Uriel Manheim, the author, is an economist who has done extensive research work in urban and regional development. Formerly associated with the University of Miami, he now heads the division of research for Housing Securities, Inc. Mr. Manheim's attention to trends in the field of urban development makes his analyses helpful to home builders and to manufacturers of building materials. His investigations are part of the continuing program of research instituted by his colleague, Dr. Reinhold P. Wolff, director of the Bureau of Business and Economic Research of the University of Miami. This program was incorporated into the work of Housing Securities, Inc. by Thomas P. Coogan, its founder and president. Housing Securities Inc. is a national mortgage clearing house dealing in government guaranteed and insured mortgages to facilitate the flow of money to areas short of mortgage funds. The company has recently diversified its activities by entering into the field of housing consultation.

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Plan-itorial . . .

Sales Volume Shifts in Downtown Areas

Sales volume figures for central business districts are being examined for trends that indicate the business condition in which downtown finds itself. Shifting population, newer shopping areas, increased traffic congestion are among the factors affecting downtown's ability to retain its position businesswise. Until the 1954 Census of Business, we had no statistics to reveal any evidence of adverse forces at work. Now an analysis is available from 48 reports on "Central Business District Statistics" recently released by the Census Bureau. The Office of Area Development has made the analysis in a staff paper released in March 1957. Parts of this paper are excerpted here.

Highlights of Findings

In 45 large metropolitan areas, retail store sales rose 32.3 percent between 1948 and 1954. But sales in their downtown districts, on the other hand, increased by only 1.6 percent.

In 1954, these large metropolitan areas accounted for 45 percent of the $165.5 billion retail store sales in the United States. Their central business districts shared only 7.5 percent of this total, a drop from 9.7 percent of the 1948 national total.

There was a wide variation around the "average" increase of 1.6 percent in the CBD sales: 15 business districts suffered declines of 1 to 16 percent, while the other 33 reported gains ranging from 1 to 37 percent. No CBD, however, equaled the sales growth of the metropolitan area in which it is located.

Central business district sales of the larger population centers failed to keep up with even the modest gains of business districts in the smaller principal cities. Four of the five cities with over one million population had CBD sales declines of 5 to 11 percent. Only the New York City business district showed a gain of 5 percent. At the other end of the scale, cities in the 100 to 249 thousand population class showed an average increase in CBD retail volume of over 11 percent between 1948 and 1954.

In areas where the rate of population growth in the central city has been greater than, or not far below, the population growth of the metropolitan area as a whole, CBD retail sales growth was better than average. However, where the over-all metropolitan population growth greatly exceeded the growth rate of the principal city, such relative "dispersion" of consumers in the area was reflected in a drop in the CBD retail sales volume.

There was also wide variation around the average CBD sales growth by kind of retail business. Three of the 10 major activities showed absolute declines of about three percent each: General merchandise stores (including department and variety stores), apparel and accessories stores, and drug stores. These three retail groups, however, accounted for three-fifths of all CBD retail dollar volume.

Aim of the Report

The Census Bureau has issued a series of special bulletins entitled "Central Business Districts" for each of 48 principal cities in the U.S. based on the 1954 Census of Business. These bulletins show changes in retail store sales between 1948 and 1954 for each CBD, the city, and its metropolitan area. The analysis report by the Office of Area Development presents a summary of general trends by aggregating the 48 individual bulletins with respect to some of their key statistics. Some of the broad implications are apparent from the changes in retail activity in central business districts when the districts are compared with their respective metropolitan areas. The analysis report serves as a background setting against which to measure experiences of individual central business districts. The staff paper can be requested from Office of Area Development, U.S. Department of Commerce, Washington 25, D. C.

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NICHOLS FOUNDATION RESEARCH PUBLISHED

Relationships between land value and land use are phases of urban land economics too often neglected in city planning. The J. C. Nichols Foundation of ULI has just published a study on the subject as applied to a central business district.

The study is the work of Gerald K. Taylor, Jr., holder of the Foundation's Grant-in-Aid for 1955-1956 while a graduate student in city planning at Georgia Institute of Technology. As a method of determining and understanding relative value changes for property uses in a central business district, this study makes a significant contribution. The Foundation Committee of ULI is pleased to make Mr. Taylor's report available even though the quantity is limited.

(*Continued on Page 8*)

RESIDENTIAL GROWTH PATTERNS IN METROPOLITAN AREAS

By

Uriel Manheim, Economist
Housing Securities Inc., New York City

The first post-war decade was the biggest residential building era ever in the annals of the United States, or any other country for that matter. Between 1946 and 1956, a total of 10,750,000 non-farm dwelling units were started—comprising an average of over one million units per year. The total investment for these units amounted to an estimated 90,880 million dollars.

The nearly 11 million units swallowed a sizable chunk of land—in the neighborhood of three million acres or 4,700 square miles—not to mention the areas of public use such as roads, schools, shopping centers, etc.

The sheer magnitude of this building volume becomes apparent when considering that it houses some 30 million persons and is equal to erecting from scratch the five top metropolitan areas in the United States—all having over one million dwelling units. These areas, in sequence of housing inventory size, are: New York, Los Angeles, Chicago, Philadelphia and Detroit. Moreover, the estimated three million acres would form a continuous housing development spreading over an area equal in size to the state of Connecticut. This is the picture in the aggregate.

By breaking the aggregate up into units of metropolitan areas, the student of urban growth may find to his surprise the existence of a wide variety of expansion patterns. Area trends were far from uniform—the degree of growth having been governed by the dimensions of demographic and economic forces in action, and the existing land use and transportation patterns.

All too often the residential building market is viewed as a national or regional entity. There can be no doubt that the national building level influences local markets. However, local factors may be as strong as, if not stronger than, national ones, and they play an important part in determining the final level of building activity. The interplay of local and national forces results in a residential building pattern peculiar to the community in question. The characteristics of these various shades of urban growth are covered in more detail in the following discussion.

The examination of residential expansion patterns initially involves an assessment of residential growth in absolute terms, i.e. Which areas accounted for the bulk of the home building volume? This is followed by an evaluation of relative growth, i.e. Which communities tended to expand fastest? Which were slow to grow? No less important is the problem of residential building rates. Which have been the most active centers in building intensity? Which ones were rather sluggish? Finally, the question of relative stability of building levels must be considered. Which areas experienced wide variations, and which maintained a comparatively steady volume?

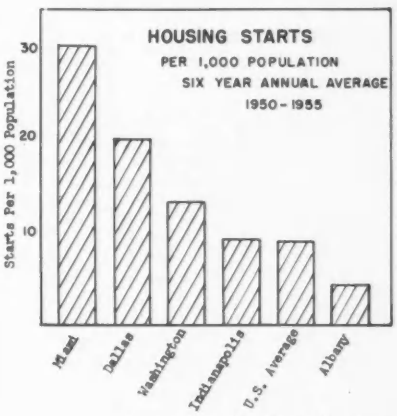
A look at the 75 most important standard metropolitan areas will indicate the prevailing trends in residential growth and point up the wide range of variations that exist among cities. The experience of these 75 areas in the period 1950 to 1956 affords a good cross section of shades of urban growth and reveals answers to some of the questions posed above.

Distribution of the Physical Volume of Residential Building

The lion's share of the post war residential building volume was concentrated in relatively few key areas. Of the 7.3 million non-farm units built between 1950 and 1956, an estimated 5.3 million or 73 percent of the total were erected in metropolitan areas. A breakdown by cities shows further that a handful of centers accounted for most of the volume.

In a class by themselves stand the metropolitan areas of New York and Los Angeles, each accounting for eight percent of the national volume. The top ten metropolitan areas had a third of the volume. About half of all housing starts were concentrated in twenty-five areas. The top fifty cities accounted for sixty percent. Thereafter, the distribution of housing starts spreads thinner and thinner over more than 100 metropolitan areas and numerous smaller communities.

There exists little relationship between the size of a city and its residential building volume. True, in many cases the sheer magnitude of a metropolis commands a certain building



Source: Housing Securities Inc.

level. But here the relationship ends. Metropolitan areas with similar populations may have different building volumes. Frequently, smaller areas have a larger volume than their bigger sisters. This point is exemplified in the tabulation listing the 25 leading areas in total home building volume. For instance, Houston ranked ninth in size of housing starts while its population commanded only 15th place among the nation's metropolitan areas. Then again, Boston's housing start volume ranked 11th as compared to its population rank as 6th. A comparison of the New York and Los Angeles metropolitan areas provides a striking example. The total home building in both is about equal, but New York's population is two and one-half times that of Los Angeles.

Residential Growth of Urban Areas

The rapidity of residential expansion has a great deal to do with the orderly development of a community. Various

DISTRIBUTION OF TOTAL NON-FARM HOUSING STARTS, 1950-1955

	Total Units (in 000)	Percent of Total	
		Non-farm Starts	Metropolitan Area Starts
Total Non-farm Units	7,270	100.0	100.0
New York and Los Angeles	1,140	15.7	21.5
Top 10 Metropolitan Areas	2,440	33.6	46.0
Top 25 Metropolitan Areas	3,460	47.6	65.3
Top 50 Metropolitan Areas	4,300	59.2	81.1

TOTAL HOUSING STARTS, 1950-1955
25 Leading Metropolitan Areas

Standard Metropolitan Area	Estimated Total Housing Starts 1950-1955	Housing Start Rank	Population Rank End of 1955
New York—Northeast New Jersey	578,500	1	1
Los Angeles	563,000	2	3
Chicago	260,000	3	2
Detroit	211,000	4	5
Philadelphia	205,000	5	4
San Francisco—Oakland	160,000	6	7
Washington, D. C.	134,300	7	10
Miami—Fort Lauderdale	133,000	8	19
Houston	106,000	9	15
Baltimore	87,600	10	12
Boston—Laurel—Lawrence	84,000	11	6
Dallas	82,800	12	22
Cleveland	82,000	13	11
Pittsburgh	79,500	14	8
San Diego	78,000	15	20
St. Louis	77,000	16	9
San Bernadino—Riverside	76,600	17	30
Atlanta	68,200	18	24
Minneapolis—St. Paul	64,700	19	13
Denver	64,400	20	27
San Jose	55,200	21	48
Buffalo	53,000	22	14
Kansas City	53,000	23	18
Milwaukee	52,200	24	17
Tampa—St. Petersburg	51,000	25	37

growth rates would imply different approaches to urban development. A better knowledge of the various expansion rates of cities and the underlying forces affecting them may be of assistance in planning ahead and hedging against disorderly growth.

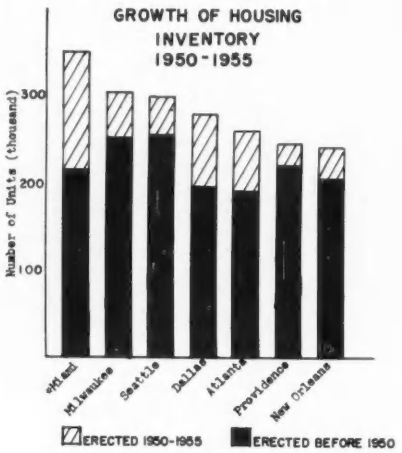
A large residential building volume is not always indicative of fast growth. Building levels by themselves have little meaning unless compared to the standing housing inventory. For instance, the 580,000 units built in the New York metropolitan area between 1950 and 1956 appear formidable, but their actual impact on the region was felt less than the 40,700 units erected in Sacramento, California. In the latter case, the new additions represent an increase in the housing inventory of 47 percent, while in the instance of New York the gain is a mere 14 percent.

The various growth rates of urban residential areas demonstrate the wide gap existing between one community and another. For the 75 most important areas, gains varied from 61 percent for the Miami-Fort Lauderdale area to a low of 9 percent for the Albany area in the period 1950 to 1956. For comparison, the average growth rate of the 75 metropolitan areas was 21 percent while the national average was 17 percent—indicating a higher intensity of building in the larger urban centers.

Areas of similar expansion rates tend to display certain general characteristics. It appears that the residential rate of growth is not a mere coincidence but is closely tied to the development pattern of an area. The economic structure of a particular community, as well as its land use pattern, has much influence in determining residential building levels. This is illustrated in a grouping of areas in terms of the relative growth of their housing inventories. The general characteristics typifying specific areas within each group are summarized below:

Very fast expanding metropolises—represent relatively young cities which have been subjected to an enormous wave of migration and subsequent economic growth. The degree of industrialization in these communities is, by and large, modest.

Fast expanding metropolises—assume similar characteristics but include also older, well established centers. The latter experienced a more than normal expansion, primarily because of economic impacts extending beyond the normal growth of the area. For example, Norfolk and Washington, D. C. had more than usual increases in federal activity, which in turn resulted in a heavy population influx and a reinforced demand for shelter.



Source: Housing Securities Inc.

Medium expanding metropolises—displayed a growth above the national average. This group is represented by well entrenched centers which have been subject to a more than normal industrial expansion.

Slow expanding metropolises—have a growth rate similar to the national average. They include mature manufacturing and commercial centers which played a leading role well before some of the newer communities sprang up. Many areas within this group had a slight net population influx.

Very slow expanding metropolises—are areas which have been slow to catch on to the post-war housing boom and did not fully participate in the gigantic industrial expansion which has been taking place throughout the nation. The majority of these cities showed a gain in population which was below the national average—indicating an actual decrease (when the net overall population increase rate is considered).

Of interest is the fact that the fast expanding areas have usually a relatively small degree of industrialization and ratio of manufacturing workers to total employment. The slow expanding metropolises, on the other hand, display a high degree of industrialization and a greater than normal ratio of manufacturing workers to total employment.

GROWTH RATE OF DWELLING UNIT INVENTORY, 1950-1955
Selected Metropolitan Areas
(Figures represent percent gain of Dwelling Unit Inventory 1955 over 1950)

Very Fast Expanding Metropolitan Areas

	%
Miami	61
Albuquerque	57
Sacramento	47
Wichita	43
Dallas	42
Phoenix	41

Fast Expanding Metropolitan Areas

	%
Denver	35
Atlanta	35
Tampa-St. Petersburg	33
Washington, D. C.	32
Memphis	31

Medium Expanding Metropolitan Areas

	%
Oklahoma City	26
Detroit	25
Richmond	24
Hartford	23
San Francisco	22
Milwaukee	21

Slow Expanding Metropolitan Areas

	%
Philadelphia	19
Indianapolis	19
Birmingham	18
Buffalo	17
Chicago	16

Very Slow Expanding Metropolitan Areas

	%
Cincinnati	15
New York	14
Omaha	13
Boston	11
Albany	9

	%
National Average	17

Intensity of Residential Building Levels

How active is the housing market in a certain area? How do the building rates of various cities compare with each other and with the national rate? Which areas have been ahead and which behind in receiving their share of the high building levels prevailing in the nation?

A criterion commonly applied for gauging the rate of residential building is the ratio of housing starts to population. This measure, expressing housing starts per 1,000 persons, reflects the intensity of residential building levels in any given community.

There exists a wide range in building intensity rates from one community to another. The extremes vary from a low of 4.3 housing starts per 1,000 population in Albany to a high of 30 in Miami. (These ratios are based on six year averages of both housing starts and population. Since these averages are based on estimates, the resulting ratio is not necessarily accurate in the statistical sense, but is indicative of the general trend.)

Despite this wide range of building rates, a sizeable number of areas tended to cluster around the overall national ratio which was a little over nine. Half of the 75 areas had a building rate lying within a two point margin of the national average. Most of the extreme cases are those cities which had abnormally high building activity.

It appears that the rate of residential building levels is identified with distinct geographic regions. The fifteen most active centers are all located in the West and South, with the sole exception of Wichita. On the other hand, the fifteen slowest areas, aside from Mobile, are all located in a broad region extending from the Middle West to the Northeast.

The great variety of building rates reflects, by and large, the various forces at work in different localities. An area is overbuilt or underbuilt only insofar as its general growth does not keep pace, or runs ahead of, the residential expansion rate. The building intensity rate is helpful in tracing some of these relationships. It can point out, for instance, whether building levels outdistance or trail behind the normal population growth of any one area. To illustrate—many of the cities whose building intensities were below the national average, did experience a better than normal population gain. In such instances, it would appear that these areas are relatively underbuilt and would probably increase their home construction level under favorable economic and political conditions.

The building intensity rate is often a useful tool in analyzing changes in building trends that are not reflected in the absolute volume of housing starts. In comparing the national building rate in 1955 with the 1950-1955 average, the ratio increased slightly from 9.1 to 9.4 housing starts per 1,000 population. This increase thus reflects the strong building activity prevailing in 1955. A reverse trend is offered by Miami, which had a ratio of 27.3 in 1955 as compared to its 1950-1955 average of 30.8. In other words, the building intensity rate in Miami did not keep pace with previously maintained levels. Similar comparisons are presented in the accompanying table for a selected group of metropolitan areas.

Areas reporting "gains" in their building rates are those cities which started only of late to expand rapidly, like San Bernardino, San Jose and Flint. This category also includes cities whose building volume was pushed forward by the national upswing in 1955 or, more precisely, which shared fully in the ample supply of easier mortgage credit. Representative examples of this category are Fresno and Richmond.

Areas that record "no" or "little change" indicate either a rising building volume accompanied by a similar population growth, as for example Orlando and Los Angeles, or a relatively static condition where population

INTENSITY OF RESIDENTIAL BUILDING
Representative Metropolitan Areas

Standard Metropolitan Area	Housing Starts Per 1,000 Population 1950-55	1955	Direction of Building Rate in 1955
San Jose	25.0	29.0	Gaining
San Bernadino-Riverside	24.0	30.0	Gaining
Orlando	23.6	23.7	No change
Albuquerque	23.0	17.3	Declining
San Diego	19.0	14.4	Declining
Houston	18.8	15.8	Declining
Los Angeles	18.6	18.5	No change
Flint	12.0	17.6	Gaining
Augusta	11.0	9.5	Declining
Richmond	11.0	12.7	Gaining
Fresno	10.0	13.2	Gaining
Rochester	7.4	8.8	Gaining
Cincinnati	7.3	7.0	No change
Boston	5.3	5.2	No change

gains are minimal, like Cincinnati and Boston.

A "decline" indicates that past building rates are not maintained. The reasons differ, but roughly fall into two categories—those areas going through a temporary pause trying to catch their breath from a previous housing boom, as exemplified by San Diego and Houston, and those in which the decline results from a general lowering of building levels dictated by a slow down in the city's growth, as for instance, Augusta and Albuquerque.

Stability of Residential Building Levels

The annual variation in home building levels becomes important in determining how stable the local housing market is and how it reacts to outside pressures.

Residential building levels have a tendency to vary widely over a span of years. Therefore, stability becomes relative in the full sense of the word. In the final analysis, it resolves itself into how wide a spread exists between the low and high points of residential starts.

The degree of variation for a representative sample of cities is presented in the accompanying tabulation which classifies the areas according to the percent difference between the highest and lowest annual volume for the 6 year period ending with 1955. No fewer than 20 of the principal 75 metropolitan areas experienced a change in annual home building volumes of at least 100 percent, while thirty showed a variation of from 50 to 100 percent and twenty-five had a change in their annual volume of less than 50 percent. The national average, by the way, was 28 percent.

The reasons for variations in building levels may differ. First, there are areas which are steadily expanding and in due course have often doubled their annual building volume. In this category fall San Bernardino and Orlando. Second, there are areas which experienced a rapid growth at some early stage, but have found it necessary to curtail their building volume when the original growth factors subsided. Centers like Augusta, or Wichita are representative of this group. Third, housing starts fluctuate in accordance with the national housing volume, which by and large, is governed by general economic activity and the availability of mortgage funds. Frequently local business conditions may aggravate or mitigate this trend. Most of the areas belong to this category.

The year to year fluctuations in housing starts are important in attempting to plan a well developed community facilities program. Too often facilities are planned without taking into full account the forces motivating residential building levels. Providing facilities ahead of their full utilization requires outlays with little or no return. More frequently, however, facilities are planned conservatively and lag behind the actual needs. An intimate knowledge of the local housing market should aid in developing better tools to anticipate the actual urban growth rate.

RELATIVE STABILITY OF RESIDENTIAL BUILDING LEVELS, 1950-1955
Selected Metropolitan Areas

(Figures represent percent difference between lowest and highest annual housing volume)

Extremely High Variation

	%
Flint	190
Augusta	164
Sacramento	161
San Bernardino-Riverside	133
Birmingham	116
Portland	110
Dayton	109
Syracuse	100

Relatively Stable

	%
New Orleans	50
Buffalo	49
San Francisco	47
Pittsburgh	42
Wichita	37
Washington, D. C.	35
Miami	33
Boston	32
Baltimore	26
Cincinnati	18

High Variation

	%
Salt Lake City	95
Atlanta	85
Chicago	80
Spokane	75
Minneapolis-St. Paul	71
Detroit	63
New York	62
Los Angeles	60
Indianapolis	58
Bridgeport	52

	%
National Average	28

Projection of Future Residential Expansion

How can the foregoing analysis of residential growth patterns be successfully used in planning future urban expansion?

As has been pointed out, residential growth trends vary from one area to another. Not only the physical volume differs, as expected, but also the building rate and the degree of annual variations show wide differences. The crux of the matter is that the relationship between building levels and population is subject to many influences which are inherent in the particular characteristics of a community. Each community follows a certain growth pattern which is governed by its economic, demographic and physical make-up.

A common practice is to view residential expansion and population increase as going hand in hand, the assumption being that a population increase must be accompanied by a similar expansion of the housing stock, or, conversely, that an increase in housing starts is indicative of a corresponding population growth. Such assumptions are subject to pitfalls, as the preceding analysis has attempted to illustrate.

Population growth and the rate of family formation are, of course, of prime importance in influencing residential building levels. But population growth by itself is no guarantee of a similar growth in the housing sector. There are other factors that enter the picture, such as national and local business conditions, income and racial breakdown of the population, political climate, land prices, building costs, and land use and transportation patterns. On the other hand, some elements, particularly sociological ones, may create a substantial building volume, yet the gain in population is minimal. This is especially evident in older communities which are composed of many ethnic groups.

In projecting future residential growth, it is advisable to use a yardstick which would incorporate all the various forces affecting a particular housing market including population trends. Such a yardstick is provided by the established residential building pattern of a community.

The experience during the post-war period, and in particular since 1950, is sufficient to make certain generalizations relative to the behavior of each respective housing market and the possible future course it may take. As

a base for such a projection, we take the annual average of housing starts for a period of at least five to six years. For this purpose, the period from 1950 through 1955 offers an excellent average. A few examples are presented below:

Standard Metropolitan Area	Housing Starts Annual Average 1950-1955
New York-Northeast N. J.	96,400
San Francisco-Oakland	26,700
Miami-Ft. Lauderdale	22,200
Baltimore	14,600
Atlanta	11,400
Buffalo	8,800
Indianapolis	5,400
Grand Rapids	2,800

The next step is to see whether this annual average of housing starts can be taken as a norm or whether it needs modification on the basis of recent developments. Along these lines, the following check points may serve as a guide in appraising the local scene:

1. What are the general growth prospects of the area? Is the present rate to be continued, accelerated or slowed down?

2. At what phase of the residential building cycle is the local housing market? Is it an ever growing market? Has it reached its peak? Is it declining? Or is it a steady market in a mature stage?

3. Intensity of home building—Is the building rate (in relation to population) to improve, stay the same or decrease? If decreasing—Is the decline temporary, subject to reversal, or has the area reached a high point and is slowing down?

4. Degree of variation of building levels —consider past extremes as indicative of possible future minimum and maximum levels. Analyze factors leading to variations—To what extent is the local market influenced by national or regional trends? Does the area depend greatly on outside mortgage funds? If yes, what is the outlook for the national scene?

5. Is there enough land available for projected growth? If not, what alternative solutions are considered? What satellite communities may absorb the overflow?

The answers within this framework should point out whether to increase, decrease or assume the same building levels as in the past.

This projection provides an indication of the expected average growth and is most helpful in planning ahead for a three to five year span. Those planners, however, who are concerned more with year to year building levels (the public utility field in particular) should remember that residential building patterns do not tend to change overnight. A close check on the local housing market along the lines discussed here will readily reveal turning points in the general trend. Needless to say, the continuous study of the behavior of local housing markets becomes a "must" to all concerned with the growth of urban areas.

SEWAGE LAGOONS

New information recently developed in the field of sanitary engineering has created renewed interest in the use of "sewage lagoons" or "waste stabilization ponds" as an effective method for disposing of raw sewage from the small residential community. The method is essentially one of spilling raw sewage into the center of a shallow and more or less impervious basin where the natural processes of sunlight, aerobic bacteria and algae can operate under favorable conditions.

Sewage lagoons have been used since 1948 principally in the Great Plains and Southwestern states. This development stems from experience with a natural dammed-off lake which had operated satisfactorily for 20 years previously in Fessenden, North Dakota. Lagoons are now in use in several hundred small communities and serve populations ranging from 100 to around 10,000 or more. Lagoon areas range from one to 130 acres and require around an acre of water area, four feet deep, per 100 population. Under favorable conditions lagoon treatment approximates that of conventional secondary treatment at a fraction of the cost. Construction costs in North Dakota ranged from 7 to 13 dollars per capita, exclusive of land. Maintenance costs are correspondingly low.

Before land developers start sewage lagoons, however, it is well to point out that they are not universally acceptable —as yet—nor are they adaptable to all localities. Land cost is a factor, as is limitation on the size of the area to be served, and the urban character of the area. A great deal more engineering study is required also before adequate standards are available.

For those developers who would like to look more deeply into the subject, the following publications are recommended: "Waste Stabilization Ponds —1956"; "Investigation of Primary Lagoon Treatment at Mojave, California"—October 8, 1956; "Raw Sewage Lagoons in the Midwest" by Glen J. Hopkins and Joe K. Neel, May 1956; "Experimental Lagooning of Raw Sewage" by Hopkins and Neel—*Sewage and Industrial Wastes*, November 1956 issue. Except for the latter these are available from Department of Health, Education and Welfare, Public Health Service, Washington 25, D. C.

In addition to these publications, Ansel N. Mitchell, Chief Engineer, The J. C. Nichols Company, Kansas City, Missouri, has prepared an outline describing construction and operational features of sewage lagoons. He also points out their principal disadvantages and limitations. The following paragraphs are Mr. Mitchell's analysis of sewage lagoons:

Oxidation of Raw Sewage

Raw sewage oxidation basins or lagoons which are a new environment for the aerobic bacterial sewage treatment process used in most modern plants have been used frequently in the last few years in the Kansas City Metropolitan Area to provide small suburban residential developments (up to several hundred homes) with temporary sewage treatment. It is planned that when local watershed development has progressed to the point that trunk sewers and ultimately permanent sewage treatment works can be financed, the original, temporary, low-cost facility can be abandoned. In such cases, the lagoon site will be inexpensively reclaimed by spreading the earth dykes over the pond bottom to re-establish surface drainage, and the land then used as home sites.

Construction Features

The principal construction features of the oxidation basin are: (a) an earth bottom and dyked pond of controlled 1½ to 4 foot water depth; (b) a size to provide a water surface area of one acre for each 100 to 400 persons tributary to it; (c) sewage influent and effluent pipes as far apart as possible to prevent short circuit flow through the basin, the influent pipe being arranged for horizontal flow discharge near the bottom and the effluent pipe for take-off below the pond surface; (d) compacted dykes flat enough (3 to 1) and high enough (2′ freeboard) to withstand wave action; (e) bottom and dykes sufficiently impervious to maintain not less than one foot of water depth during the season of highest

evaporation and seepage losses (in some states, most lagoons are designed on the basis of never having any effluent because of evaporation and seepage losses); (f) located at least 500 feet from the nearest habitation and preferably ¼ mile or more therefrom.

Operational Features

The important operational features of the oxidation basin are: The natural prolific growth (without any artificial seeding) of algae in the stored sewage results in the release of oxygen into the water by photosynthesis. This creates a favorable environment for the growth of aerobic bacteria which have the faculty of reducing the unstable elements of sewage to stable conditions without nuisance. The aerobic bacteria is sustained in part by the above mentioned production of oxygen and, in turn, releases carbon dioxide on which the algae feed. The complete treatment process is accomplished in a single pond through highly efficient settlement of the sewage solids due to the retention period of many days. There is uniformly high degree of treatment efficiency both as to reduction of B.O.D. and of B. Coli resulting in favorable comparison with the results obtained from highly mechanized plants. With the lagoon there is no sludge disposal problem. There is very low operating cost, since only simple operating functions are required such as protection of the dykes against muskrats and other burrowing animals, mowing of weeds and grasses on the dykes above and below the water line, and occasional hand skimming and burying of wind-blown floating material such as leaves, grease, etc.

Principal Disadvantages

The principal objections or disadvantages to the sewage oxidation basin include: The requirement of a greater area of land for a given population load than for any other sewage treatment process. For example a city of 100,000 at 200 people per acre, would require 500 acres of water surface. There is reduced efficiency during winter in areas where freezing temperatures prevail, due to shorter hours of sunlight, and light-screening effect of ice cover, possibly resulting in some anaerobic bacterial action, the cumulative effect of which may cause a few days of odor nuisance at the time of thawing in the spring. However, the latter instance is one which applies with equal or greater force to all treatment processes. To date there is an instinctive unfavorable reaction by the uninformed public to proposals for such facilities.

Advantages

The raw sewage oxidation basin seems to be ideally suited for use as a permanent sewage treatment facility in areas of relatively low raw land values, especially where existing watercourses do not have an adequate stable flow to provide satisfactory dilution of plant effluents. Sewage lagoons have advantages as temporary facilities for suburban areas not yet sufficiently developed to support complete watershed-wide sewage collection and treatment systems. Similarly sewage lagoons are useful as permanent or temporary supplementary treatment facilities to relieve existing overloaded plants or to provide a higher degree of treatment.

Examples

The largest sewage lagoon system ever designed is scheduled to be built for Regina, Saskatchewan. As reported by the engineers who designed it, the system will consist of eight lagoons spread over a 2,400 acre site. This is the best answer, the engineers say, to Regina's urgent need to expand and replace its obsolete sewage plant. Regina is ideal for lagoon treatment since it is surrounded by prairies where good wind-flow can speed bacterial action.

Sewage oxidation lagoons or basins have been used most extensively for permanent facilities by cities in North Dakota and neighboring states. The city of Lund in Sweden is noted for its highly efficient mechanized oxidation basins which include recirculation facilities and operation of lagoons in series.

BOSTON'S BACK BAY CENTER

Prudential Insurance Company of America has set the stage for a vast concentrated play that might very well energize the whole City of Boston into a new era of construction projects, new industries, rising revenues, and progressive action. The impending rejuvenation comes from Prudential's announced plan to go ahead with its office building in Boston, thus anchoring the related projects included in the Back Bay Center.

Back Bay Center is a development to be placed on the 28 acre in-town site of the Boston & Albany Railroad's former passenger car yards. Four years ago, Boston's hopes for the development of this dormant area quickly soared when a syndicate of New York and Boston capital prepared promotional models and studies for starting a project on the land long owned by the B & A. Then foggy land titles, tax assessment agreements, and a lengthy list of other obstacles caused the earlier promoters to bow out. Now Prudential has come to the rescue.

Prudential will build its office skyscraper. Actual construction work is scheduled to start this fall. This construction enables the City to go ahead with its planned auditorium within the site. The Prudential's building also indicates feasibility for the other features of Back Bay Center—hotel, apartments, stores, parking, and access by freeway—all tied together by comprehensive, coordinated planning and development, and municipal cooperation.

FORCED PARK AREA DONATIONS ILLEGAL IN MICHIGAN

Mandatory donation of land for school or park sites as a condition for plat approval has been ruled an illegal practice by Michigan's Attorney General. The ruling, as reported by *House and Home*, held, "Nowhere does any provision of law require that the would-be platter of land shall donate or deed *without compensation* areas of land within the plat to a municipality for public purposes as a condition precedent to the approval of a plat." The opinion came in response to a request from the Builders Association of Metropolitan Detroit and will invalidate provisions in subdivision regulations that call for mandatory dedications of land for community facility purposes.

NICHOLS FOUNDATION RESEARCH PUBLISHED

(*Continued from Page 2*)

Copies of the research are being placed in college libraries subscribing to Urban Land Institute publications throughout the country. **Other educational institutions interested in obtaining a copy of the research for their library should write the Institute without delay for a complimentary copy. The balance of the printing will be available to individuals and firms for $5.00 a copy while the supply lasts.**